

**NJDOT Bureau of Research
QUARTERLY PROGRESS REPORT**

Project Title: Stability and Accuracy of HCM LOS in Darkness and Adverse Weather				
RFP Number: 2003-23		NJDOT Research Project Manager: Vincent Nichnadowicz		
Task Order Number/Study Number: TO-64		Principal Investigator: Chien, Steven I-Jy		
Project Starting Date: 01/01/2006		Period Starting Date: 04/01/2008		
Original Project Ending Date: 12/31/2007		Period Ending Date: 06/30/2008		
Modified Completion Date: 09/30/2008				

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search	5	0	100	5
Literature Review	5	0	100	5
Study the accuracy of the current Highway Capacity Manual	10	0	100	10
Develop and test alternative methods and procedures for field data collection	30	0	100	30
Perform the approved methods and procedures for estimating travel times	15	15	100	15
Enhance HCM on estimating LOS's in darkness and adverse weather	15	40	100	15
Improving transit schedule adherence through recommended methods	15	40	100	15
Final Report	5	20	20	1
TOTAL	100 %			96.0 %

Project Objectives:

- (1) Understand the accuracy of the derived current Highway Capacity Manual Levels of Service for a variety of roadways and investigate their sensitivity to the variables that determine them.
- (2) Determine how adverse weather and conditions of darkness and sun glare impact the capacity and level of service of state highways and the frequency of these occurrences.
- (3) Determine capacity levels at which traffic flows become unstable and measure the relationship between capacity and travel time variation that impact bus on time performance.
- (4) Recommend areas where the design of highway improvements, highway maintenance operations and traffic operations can be modified and/or improved, especially to aid in maintaining reliable bus schedules and reduce bus schedule conflicts.

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Project Abstract:

Currently, Highway Capacity Manual (HCM) levels of service (LOS's) are used to estimate the expected free flow traffic conditions on roadways. To operate reliably at a speed of 55 mph, for example, the maximum flow of passenger cars is set by the HCM at 2250 per hour per lane. This equates to an average interval between cars of 1.6 seconds.

Drivers are taught, however, to increase their intervals when driving in darkness and/or precipitation. In addition, some of our most heavily congested roads run east and west, and drivers can experience significant sun glare in morning and evening peak hours. Since much commuting occurs in hours of dawn/sunset/darkness and/or adverse weather, using current HCM LOS's will overstate the actual capacity that can be reliably achieved on New Jersey roads.

This research can help in designing highway improvements. It will provide better predictions of traffic capacity and LOS and more reliable travel times for buses, which will aid in reducing congestion by making transit a more attractive alternative.

There is a need to determine the capacity of per lane per hour of free flow traffic conditions on roadways under different lighting and different environmental conditions - dawn, sunset, darkness, rain (various rates), snow (wet road surface, accumulating on the surface, plowed, salted, icy spots, etc.). First one needs to understand the accuracy of the derived current Highway Capacity Manual Level of Service and to determine a set of Levels of Service that accurately predict capacity for the adverse weather driving conditions. This information is especially needed by NJ Transit to predict reliable bus running times to maintain and attract ridership.

1. Progress this quarter by task:

- Calculated and compared traffic related estimates (speed, flow, density, headway) under normal and adverse weather conditions (normal, rain, snow, darkness, sunglare) for all studied site
- Estimated the impact of adverse weather on NJ Transit bus operation

2. Proposed activities for next quarter by task:

- Prepare draft final report

3. List of deliverables provided in this quarter by task (product date):

- Literature Review Report

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- Presentations of data collection results
- Presentation of analyzed results based on collected data

4. Progress on implementation and training activities:

- submit a technical paper to TRB annual meeting

5. Problems/proposed solutions:

none

6. Budget summary:

Total Project Budget	\$305,863.00
Modified Contract Amount	\$0.00
Total Project Expenditure to date	\$296,478.43
% of Total Project Budget Expended	96.93%